

# Weekly Report

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## Intro

After Wednesday's meeting with Prof. Tung, the plans seems to be clear however some key issues should be resolved.

## Research

**Viewport selection** From the plan, we are going to design a star coordinates to adjust another basis vector of the projection plane. There are some details that remains to resolve:

- **One-to-one Correspondence** The new basis vector is given by:

$$\hat{\mathbf{n}} = \sum_{i=2}^m w_i \mathbf{n}_i$$

constrained by

$$|\hat{\mathbf{n}}| = \left| \sum_{i=2}^m w_i \mathbf{n}_i \right| = 1 \Rightarrow \sum_{i=2}^m w_i^2 = 1$$

From our previous discussion, the next step is to change the  $w_i^2$  with square into  $\hat{w}_i$ . However the mapping from  $w_i^2$  to  $\hat{w}_i$  is not one-to-one correspondence, which leads to a situation that one position in the star coordinates corresponds to multiple linear combinations of  $w_i^2$  ( $w_i$  can positive or negative). Last Friday Jiayi argued this question and we provided a solution that  $w_i$  is limited to be positive.

- **Value of Comparison** In Wednesday's meeting with Prof. Tung, he mentioned that in the non-orthogonal tour view, it is more informative to compare and show differences between projections than to just show single results. So in the next step the comparison approaches as well as animations should be resolved first.
- **Metrics for Automated Viewport Selection** The metric of an interesting projection result should also be defined. I reviewed [1] and it defined *Orthographic Energy* as an optimization function. However, the first thing before the metric is to propose what kind of viewports (projections) is regarded as "informative" ones for understanding SVM or gaining insight.

**Implementation** These days I am writing the new star coordinates-based projection control view. What is more, thanks to Xiaohong's effort, some necessary server-side features are implemented during the weekend.

## Miscellaneous

- The SVN directory for papers has been created at:  
    `svn://zjuvag.3322.org/Projects/VIS2014/visual_svm/`.  
From the next week draft updates will be uploaded there.

## Next Plans

- Propose proper metrics for automated projection selection;
- implement the new projection control view;
- write a short description about architecture of the web side and deliver it to Jiayi for further development.

## References

- [1] D. J. Lehmann and H. Theisel, “Orthographic Star Coordinates,” *IEEE Trans Visual Comput Graphics*, vol. 19, no. 12, pp. 2615–2624, 2013.